



## Gender Difference in Logical- Mathematical and Visual- Spatial Intelligence Among Higher Secondary School Students in Kottayam District

### KEYWORDS

gender difference, logical –mathematical intelligence, visual- spatial intelligence, higher secondary school students

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### ABSTRACT

The current shift from industrial society to information society places intelligence at the core of education. An American psychologist, Howard Gardner (1983), developed the theory of Multiple Intelligences. His theory states that people have different intelligences and learn in many different ways. The opportunity to learn in different ways that make learning more efficient, is also likely to make learning more effective. Attention to a student's preferred mode of learning or thinking promotes improved achievement (Tomlinson, 1999). Students will have optimum learning if the concepts, principles and skills being taught are presented in their learning style and they are able to express themselves well. The present study is intended to examine the gender difference in logical –mathematical and visual –spatial intelligence among higher secondary school students in Kottayam district. Normative Survey method was used for the study. The data was collected using logical –mathematical and visual –spatial intelligence scale from 100 higher secondary school students in Kottayam district. The collected data was analyzed using appropriate statistical techniques. The study revealed that boys are stronger in logical- mathematical and visual -spatial intelligence than girls.

### Introduction

In the traditional system of teaching, which is purely classical, there is an assumption that all students will learn the knowledge and skills presented to them through the one method utilized by the teacher. In our traditional system lecture-discussion method was used. This, however, does not give opportunity for students to learn and grow based on their own preferred mode of learning. Students are left alone in their own devices to figure out how to adjust so that they can cope with the standards.

An American psychologist, Howard Gardner (2011), developed the theory of multiple intelligences. His theory states that people have different intelligences and learn in many different ways. Furthermore, according to this theory, no two individuals have exactly the same profile of intelligences. He suggests that humans have eight intelligences: verbal-linguistics, logical-mathematical, visual-spatial, bodily-kinaesthetic, musical-rhythmic, interpersonal, intrapersonal, and naturalistic. Learning intelligences of students has something to do with how they learn. It may be shaped by intelligence preferences, gender, culture or learning style. The opportunity to learn in ways that make learning more efficient is also likely to make learning more effective. Attention to a student's preferred mode of learning or thinking promotes improved achievement (Tomlinson, 1999). Students will have optimum learning if the concepts, principles and skills being taught are presented in their learning style and they are able to express themselves well.

Children's ways of learning are as different as the colours of the rainbow. Educational system today aims to design a creative and effective interdisciplinary approach to teaching, learning and assessment taking in to account the intellectual gifts of each student (Diaz –Lefebvre and Finnegan, 1997). Learning takes place best when it can be individualized meeting the particular needs and interests of each student. It is important to know what helps students learn and then adjust teaching strategies to enhance the method of instruction. Attention to a student's preferred mode

of learning or thinking promotes improved achievement (Tomlinson, 1999). Students will have optimum learning if the concepts, principles and skills being taught are presented in their learning style and they are able to express themselves well.

Neurobiology pointed out that there are many differences between the brains of men and women. Here we listed seven of them.

- 1. Brain size:** The male brain is ten percent larger than the female brain. Although the extra mass does give males more processing power, this does not make men more intelligent.
- 2. Brain Hemisphere:** Many men are sharply left brain dominant, while women tend to be evenly balanced between left and right –brain processing. Women are therefore thoughtfully slightly more intuitive and sometimes better communicators.
- 3. Mathematical skill:** The inferior –parietal lobule, which controls numerical brain function, is larger in males than in females. On standardized tests men often score higher on mathematical tests than women.
- 4. Language:** Women often excel at language based tests for two reasons-two brain areas that deal with language are larger in females, and females possess language in both hemispheres, while male favour a single brain half.
- 5. Emotions:** Since women tend to have a larger deep limbic system than men, they're more in touch with their feelings and are better at expressing their emotions.
- 6. Spatial abilities:** The parietal region is thicker in the female brain, making it harder for them to mentally rotate objects-an important spatial skill. Women often report difficulty with spatial tasks, both on tests and in real life.
- 7. Susceptibility to brain function disorders:** Men are more likely to be dyslexic, or have other language disabilities since they are more often left brain dominant.

Gardner's model promotes personalization and individualization of a child's learning in the classroom. Silver, Strong & Perini (1997) assert that "the whole child is educated". Using multiple intelligences as a model of practice has the possibility to accommodate all students' ways of learning and diversify their experience.

In multiple intelligences teaching, teachers should first evaluate their own intelligence before carrying out multiple intelligences teaching, and use their dominant intelligence in planning materials and lesson plans (Armstrong, T, 1994). They supporting to the new paradigm of intelligence. Howard Gardner determined intelligence as a pluralistic phenomenon rather than a static structure with a single type of intelligence. According to this view one can become more intelligent in more ways only through a planned cycle of experiences and opportunities which foster each intelligence and by making these opportunities available to every child in our classrooms.

This study attempts to investigate the gender difference in logical-mathematical and visual –spatial intelligence among higher secondary school students. It aims at offering meaningful suggestions for improving the logical-mathematical and visual –spatial intelligence among higher secondary school students.

**Methodology**

The study is descriptive in nature. Normative survey was used for the present study. 100 higher secondary school students of Kottayam district were taken as sample for the study. Purposive random sampling was used for the study. Logical-mathematical intelligence scale and visual-spatial intelligence scale (prepared by the investigators) were the tools used to collect relevant data. The tool consists of 30 statements, which include positive and negative statements, set against a five –point scale i.e. I strongly agree, agree, could not know, strongly disagree and disagree. The data were tabulated and analysed by appropriate statistical techniques. The hypothesis was tested by using test of significance of difference between means.

**Results and Discussion**

The investigator find out the logical-mathematical intelligence and visual-spatial intelligence of higher secondary school students based on gender. The mean and standard deviation of logical-mathematical intelligence and visual-spatial intelligence scores of boys and girls were calculated. The mean difference of boys and girls on logical-mathematical intelligence and visual-spatial intelligence were analysed by the test of significance of difference between the mean scores. The details of the analysis are given in table 1.

**Table1:** Data and result of the test of significance of difference between the mean scores of boys and girls on logical- mathematical intelligence and visual –spatial intelligence

Component of Intelligence	Sub-groups	No.	Mean	SD	t-value	Level of Significance
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Logical-Mathematical Intelligence	Boys	45	60.89	5.16	3.01	P<0.01*
	Girls	55	49.91	6.34		
Visual-Spatial Intelligence	Boys				3.78	P<0.01*
	Girls	45	62.14	4.20		
		55	52.35	5.67		

\* t-value is significant at 0.01 level

The mean and standard deviation of logical-mathematical intelligence scores of boys and girls are 60.89, 5.16; and 49.91, 6.34 respectively. The t-value obtained is 3.01 which is higher than the table value 2.58 at 0.01 level. This indicates that there is significant difference between the mean scores of boys and girls on logical-mathematical intelligence. The higher mean value of boys indicates that they showed higher logical-mathematical intelligence than female students.

The mean and standard deviation of visual-spatial intelligence scores of boys and girls are 62.14, 4.20 and 52.35, 5.67 respectively. The t-value obtained is 3.78 which is higher than the table value 2.58 at 0.01 level. This indicates that there is significant difference between the mean scores of boys and girls on visual-spatial intelligence. The higher mean value of boys indicates that they showed higher visual-spatial intelligence than female students.

Following conclusions were arrived on the basis of data analysed.

From the above table it is clear that higher mean value of boys indicates that they showed higher logical-mathematical intelligence than girl students. They also showed higher visual-spatial intelligence than girl students

In the light of the above study, following suggestions are to be made.

To enhance logical-mathematical intelligence and visual-spatial intelligence among girl students, provide opportunities to handle long chains of reasoning in girl child, engage more in visual imageries, enhance both hemispheres equally, provide different activities and challenges that promote mathematical skills, engage more in designing and decorating, use effective teaching strategies which facilitate the strength of girl child. Though these are the suggestions to enhance logical-mathematical intelligence and visual-spatial intelligence among girl students, it is not empirically proven. Hence such studies can be undertaken in these areas.

The teachers must help the girl students to enhance logical-mathematical intelligence and visual-spatial intelligence by exposing them to a variety of ways of learning, to better individualized for their interests and needs, and to use teaching strategies that make learning more efficient, successful and enjoyable ( Borek, J,2003) . We can also foster meaningful learning experiences by using multiple teaching tools and strategies and by building positive, supportive relationship with these children.

**Conclusion**

Gardner's Theory of Multiple Intelligences provides a theoretical foundation for recognizing the different abilities and talents of students. This theory acknowledges that while all students may not be verbally or mathematically gifted, children may have an expertise in other areas, such as music, spatial relations, or interpersonal knowledge. Approaching and assessing learning in this manner allows a wider range of students to successfully participate in classroom learning.

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